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quatic Vascular Plants of New England: art 4. Juncaginaceae, Scheuchzeriaceae, Butomaceae, Hydrocharitaceae

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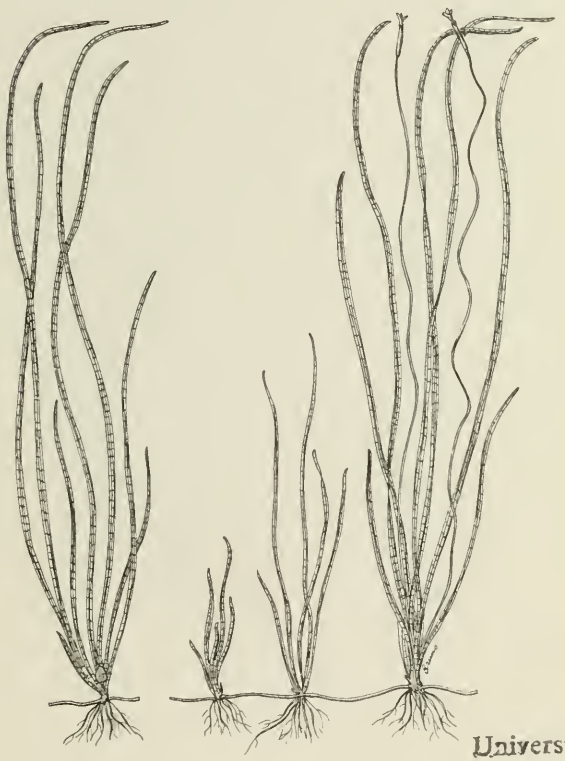

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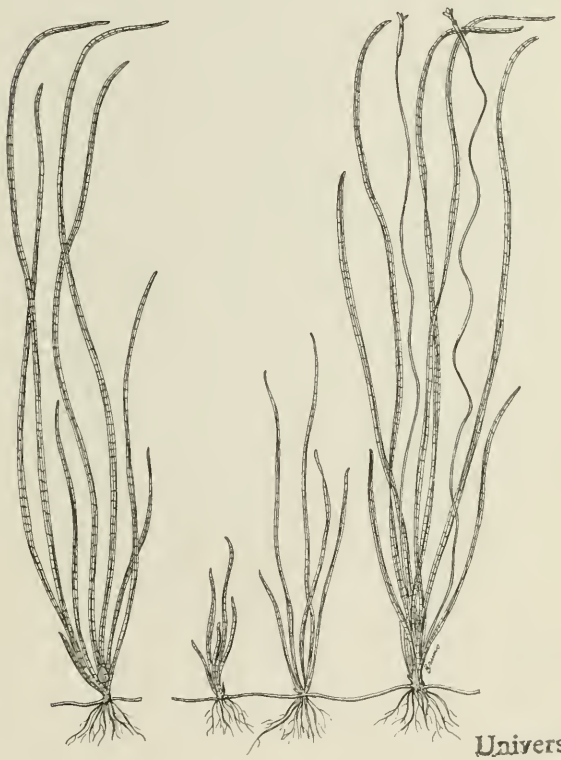

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ABSTRACT

This paper is the fourth in a series of reports on the aquatic and wetland flora of New England. It treats all species of the Juncaginaceae, Scheuchzeriaceae, Butomaceae, and Hydrocharitaceae occurring in New England and includes keys, comments on taxonomy and nomenclature, habitat and distributional information, water chemistry data, illustrations and dot maps. Those species regarded as rare and endangered in the New England Region or in one or more of the six New England states are also noted.

One species included here, *Triglochin gaspense* Leith and Löve, has been only recently described and is therefore absent from most standard manuals.

KEY WORDS: Aquatic plants, New England Flora, Taxonomy, Juncaginaceae, Scheuchzeriaceae, Butomaceae, Hydrocharitaceae, *Triglochin*, *Scheuchzeria*, *Butomus*, *Vallisneria*, *Egeria*, *Elodea*, Arrow-grass, Flowering Rush, Tapegrass, Eelgrass, Waterweed.

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Aquatic Vascular Plants of New England: Part 4. Juncaginaceae, Scheuchzeriaceae, Butomaceae, Hydrocharitaceae

by

G. E. Crow[1] and C. B. Hellquist[2]

INTRODUCTION

This is the fourth in a series of reports on the aquatic and wetland flora of New England. These reports are being prepared to aid conservationists, fish and game personnel, consultants, botanists and students in the identification of aquatic plants. The coverage is strictly New England but is of value throughout the northeast. Data have been gathered from herbaria in New England and from personal field work.

Chemical data presented represent samples from many waters throughout New England. The alkalinity readings are total alkalinity, expressed as milligrams per liter (mg/l) $CaCO_3$. The number of observations are included in parentheses following alkalinity and pH values. Since pH and alkalinity vary greatly during the day, the values are only indicative of the water quality. Chloride values are given where data are available and of value.

The rare and endangered plants lists referred to are those prepared for each of the six New England states by the New England Botanical Club in cooperation with the United States Fish and Wildlife Service, Office of Endangered Species, Newton Corner, MA (RI — Church and Champlin, 1978; MA — Coddington and Field, 1978; VT — Countryman, 1978; ME — Eastman, 1978; CT — Mehrhoff, 1978; NH — Storks and Crow, 1978). Taxa indicated as rare, threatened or endangered for the entire New England Region are also noted (Crow *et al.*, 1981, Rhodora 83: 259-299).

We invite comments and/or criticisms on this treatment. Information on any species omitted or any known localities not documented by us will be welcomed. If anyone is interested in specific localities of any of the species indicated on the dot maps, please contact us.

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Dr. C. B. Hellquist, Department of Biology, Boston State College, 625 Huntington Avenue, Boston, MA 02115.

JUNCAGINACEAE

Triglochin Arrow-grass

Plants of freshwater and saltwater marshes, perennial, arising from a short rootstock, some producing stolons; leaves slightly fleshy and rush-like; flowers in a spike-like raceme; fruit follicular, splitting into 3-6 carpels from a persistent central axis.

Key to Species

1. Leaves typically equaling scape (fig. 1A), very slender, curving outwards from the sheath at 30-40 degree angle (fig. 1B); spike 2-7 cm long.
   ..... 1. *T. gaspense*
1. Leaves typically shorter than scape (figs. 2A,E), slender to thickish, erect from sheath (fig. 2B); spike 6-45 cm long.
   2. Carpels and stigmas 3; mature fruit 1.0 mm thick, about 5-7 times as long as broad; stolons present, filiform, bearing small bulbs.
      ..... 2. *T. palustre*
   2. Carpels and stigmas 6; mature fruit 2.0-3.0 mm thick, about 2 times as long as broad; stolons absent.
      ..... 3. *T. maritimum*

1. *Triglochin gaspense* Lieth and D. Löve Fig. 1, Map 1

Rare in salt marshes of Washington County, Maine. This dwarfed species has been recently described (Löve and Lieth, 1961) from eastern North American and should be looked for along the coast of northern New England where it may be more abundant than reported. In contrast to the clumped habit of *T. maritimum*, plants of *T. gaspense* tend to form lawn-like patches in the salt marsh. Range extends locally from Newfoundland south to the Gaspé Peninsula, Quebec, Prince Edward Island, New Brunswick, and Washington Co., Maine.

2. *Triglochin palustre* L. Fig. 2, Map 2

Widely scattered along coastal marshes of Maine, rare inland along the Aroostook River where it was last reported in 1940. Two historical records from Rhode Island are known, the most recent being 1878. Range extends from Greenland and Labrador west to Alaska, south to Rhode Island, southern New York, northwestern Pennsylvania, northern Ohio, Illinois, Nebraska, Colorado, New Mexico, and California.

3. *Triglochin maritimum* L. Fig. 2, Map 3

Common in coastal marshes and rare inland in freshwater marshes of New England. This species was last found inland in 1935 in Maine. Range extends from Labrador west to Alaska, south to Delaware, western New York, northwestern Pennsylvania, northern Ohio, northern Illinois, Nebraska, Colorado, New Mexico, and California.

Literature Cited and Selected References

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SCHEUCHZERIACEAE

Scheuchzeria

Plants of bogs and peaty shores; growing from creeping jointed rootstocks; leaves linear, grass-like, broadly sheathing at base, tubular at the apex; flowers borne on a loose receme; fruit an inflated follicle.

1. *Scheuchzeria palustris* L. Fig. 3, Map 4

Widely scattered in Sphagnum bogs in New England. This species is often overlooked when not in flower or fruit. The best diagnostic character for sterile plants is the terminal pore at the tip fo the leaf. North American plants belong to variety *americana* Fern. and differ from the Eurasian plants in having larger fruits with beaked follicles. Range extends from Newfoundland west to Manitoba and Washington, south to New Jersey, Pennsylvania, northern Ohio, northern Illinois, northern Iowa, Nebraska, New Mexico, and California.

Rare and endangered plant lists: Vermont, Connecticut

BUTOMACEAE

Plants of shallow water and marshes. Perennial, arising from a fleshy rootstock; leaves erect or floating; flowers pink, perfect, numerous, borne in an umbel; carpels 6, separate, connate at the very base; fruit a whorl of follicles with long beaks.

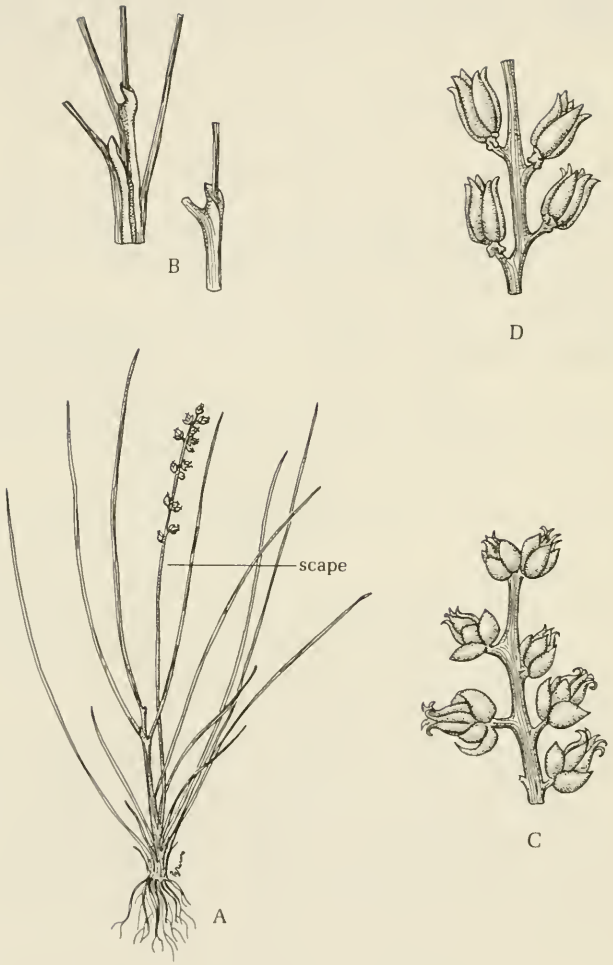


Figure 1
Triglochin gaspense: **A. habit, x ½. B. leaf sheaths, x 2. C. flowers, x 3. D. fruits, x 3.**

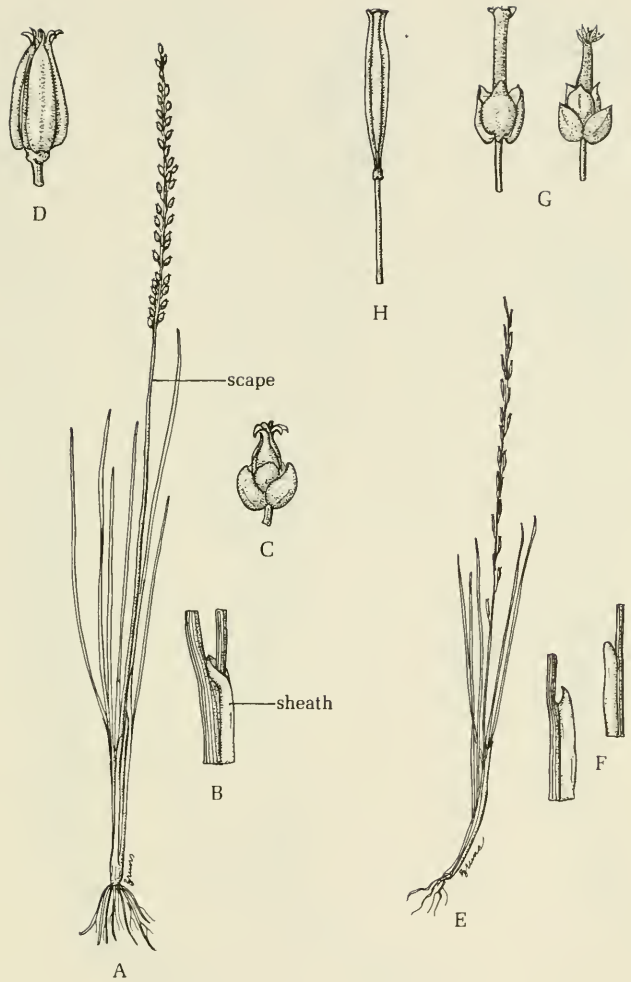
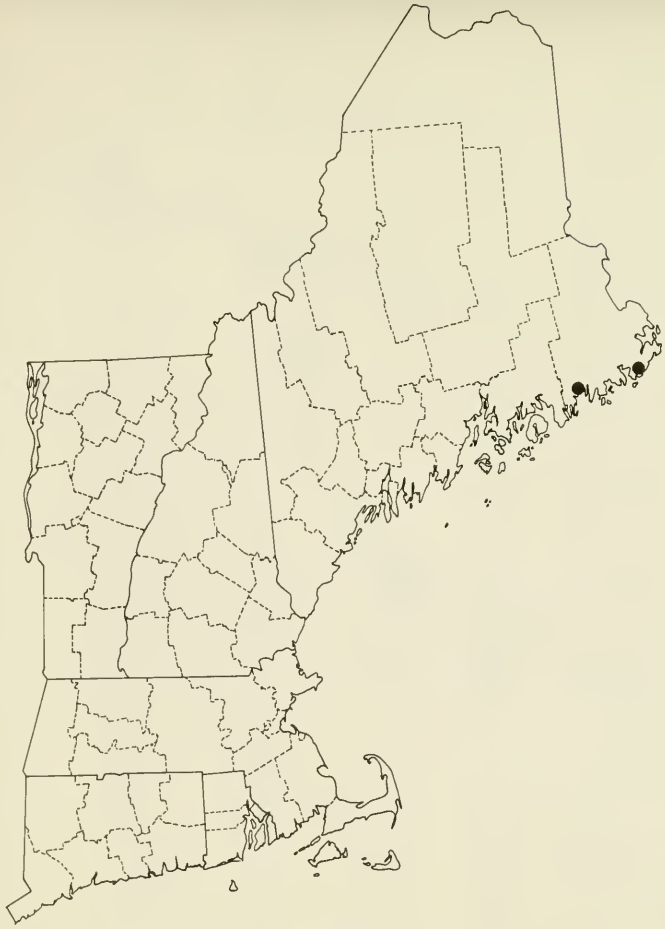
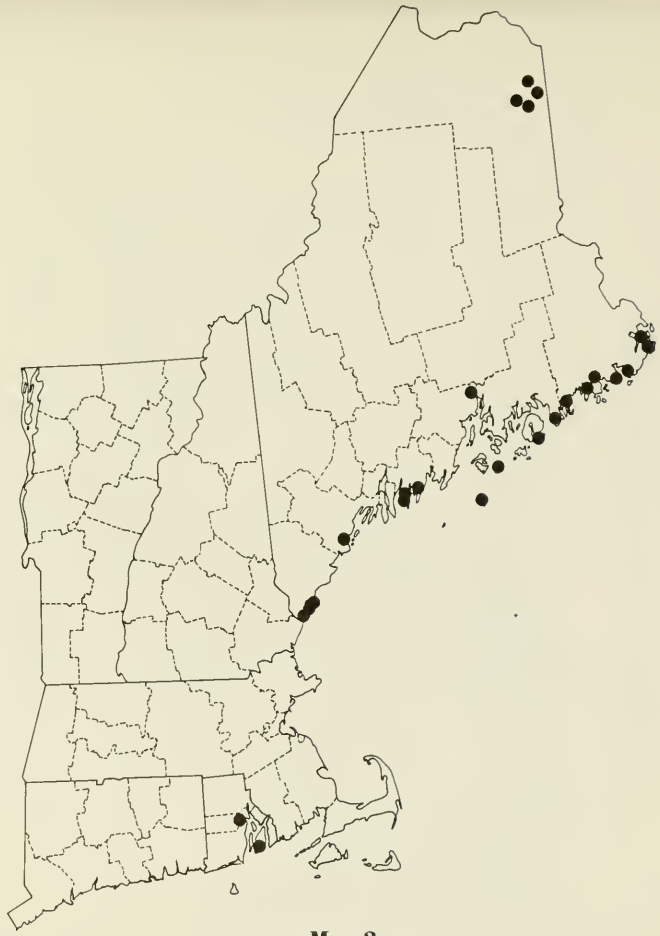


Figure 2
Triglochin maritimum: **A. habit, x 1/6. B. Leaf sheath, x 2. C. flower, x 3. D. fruit, x 3.**
Triglochin palustre: **E. habit, x 1/6. F. sheaths, x 2. G. flowers, x 3. H. fruit, x 3.**

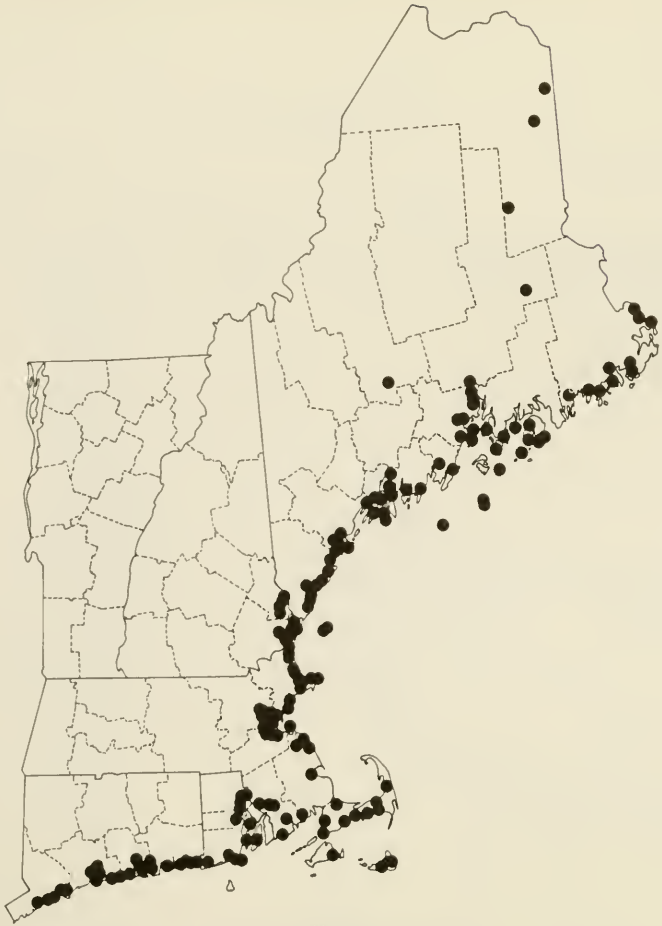
Figure 3
Scheuchzeria palustris: **A. habit of flowering plant, x ½. B. habit of fruiting plant, x ½. C. habit of sterile plant, x ¼. D. flower, x 3½. E. fruit, x 1. F. leaf tip with terminal pore, x 3½.**



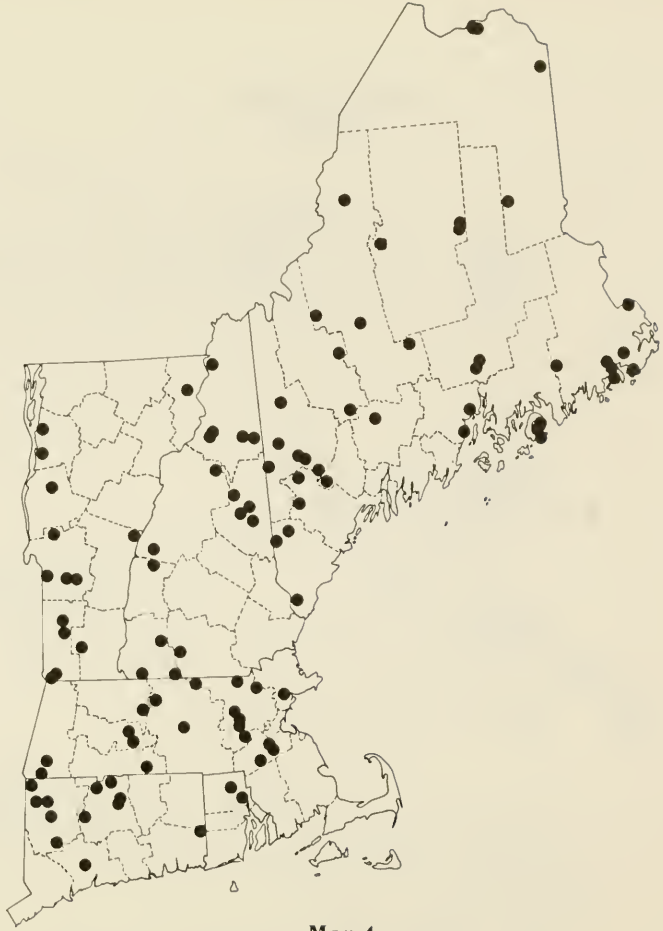
Map 1
Triglochin gaspense



Map 2
Triglochin palustre



Map 3
Triglochin maritimum



Map 4
Scheuchzeria palustris

Butomus (Flowering Rush)

1. *Butomus umbellatus* L. Fig. 4, Map 5

Common in marshes and shores along Lake Champlain and its tributaries; rare elsewhere. The oldest specimen on file was collected in 1929 from Orwell, Vermont along Lake Champlain. This species is naturalized from Eurasia and is spreading rapidly throughout the marshes in the Lake Champlain Valley. However, it does not appear to be crowding out other species. A submersed, non-flowering form, forma *vallisneriifolius* (Sagorski) Gluck is often in streams. Range extends from the St. Lawrence River system in Quebec, Lake Champlain Valley of Vermont and New York, Connecticut River Valley of Connecticut, westward along the Great Lakes to New York, Ohio, Michigan, Minnesota, Wisconsin and widely scattered locations in North Dakota, South Dakota, Montana, Idaho, and Manitoba.

alkalinity: mean 95.8 mg/l; range 55.0-153.0 mg/l; (5)
pH: mean 7.5; range 7.3-7.6; (5)

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HYDROCHARITACEAE

1. Leaves basal, long, linear and ribbon-like (fig. 5A,E) with a broad lacunae band (fig. 5G).
..... *Vallisneria*
1. Leaves cauline, short, opposite or whorled, without a lacunae band.
2. Upper leaves in whorls of 4 (-6), occasionally more; leaves 1.2-4.0 cm long.
..... *Egeria*
2. Upper leaves in whorls of 3 (-2); leaves 0.6-1.7 cm long.
..... *Elodea*

Vallisneria (Tapegrass, Eelgrass)

Submersed perennial plants of freshwater; leaves basal, long and ribbon-like; monoecious; pistillate flowers solitary, sessile, enclosed in a tubular spathe, reaching surface by peduncle elongation; staminate flowers numerous, enclosed in spathes borne on short stalks, released and floating to the surface; fruit elongate, cylindrical, peduncle recoiling after fertilization, submersing fruit.

1. *Vallisneria americana* Michx. Fig. 5, Map 6

Common in acid and alkaline waters of New England. Sterile plants of *Vallisneria* and forms of *Sagittaria* with ribbon-like leaves are easily confused. Thieret (1977) notes that *Vallisneria* does not produce milky juice (characteristic in *Sagittaria*) and rhizomes of *Vallisneria* consist of only a single internode between rosettes and they lack scales-leaves. Range extends from southern New Brunswick west to North Dakota and Nebraska, south to Florida, Texas, New Mexico, and Arizona; introduced in Washington.

alkalinity: mean 33.5 mg/l; range 3.0-115.5 mg/l; (40)
pH: mean 7.4; range 5.8-10.2; (38)

Egeria (Waterweed)

Submersed or floating perennial plant of freshwater; leaves sessile in whorls or 4 (-6) along the terete stem; staminate flowers in spathes, borne in upper leaf axils, raised to the surface of the water on a thread-like hypanthium; pistillate plants unknown in New England.

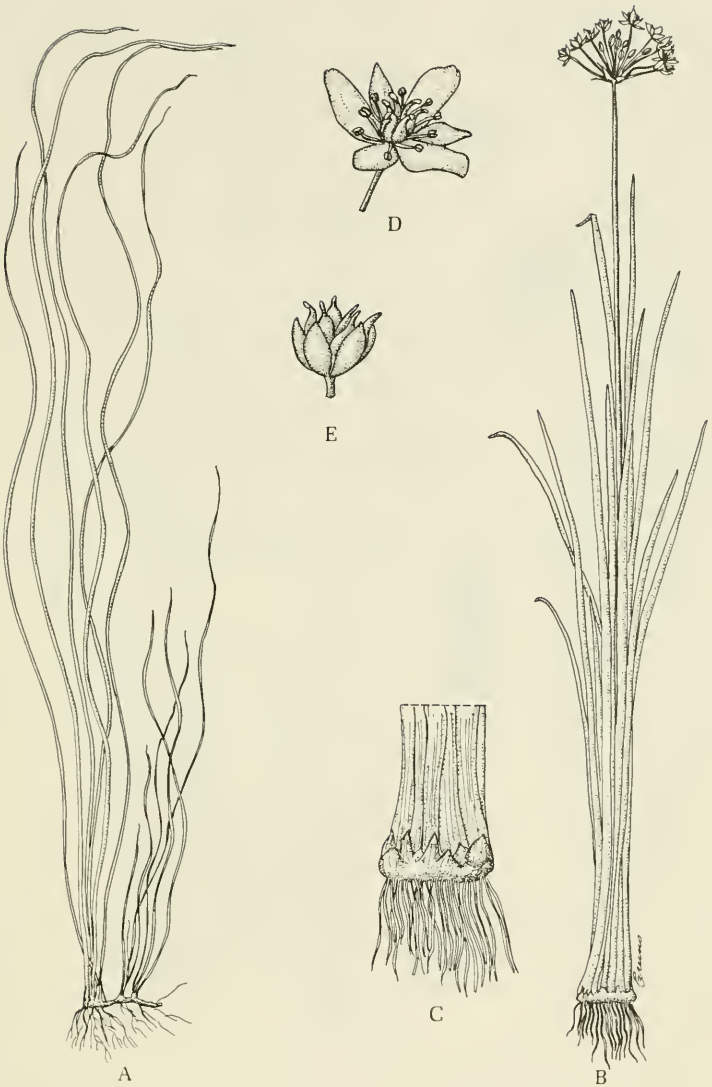


Figure 4
Butomus umbellatus: **A. habit of submersed plant, x ⅛. B. habit of emersed plant, x ⅛. C. plant base, x ¼. D. flower, x 1. E. fruit, x 1.**

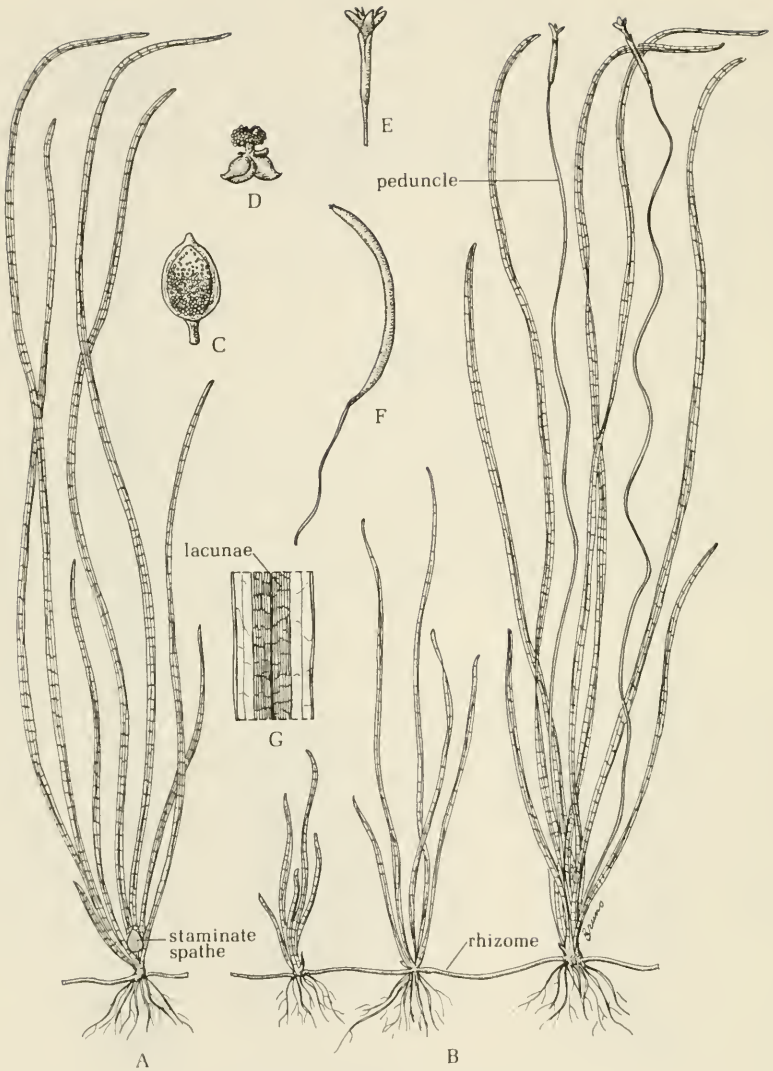
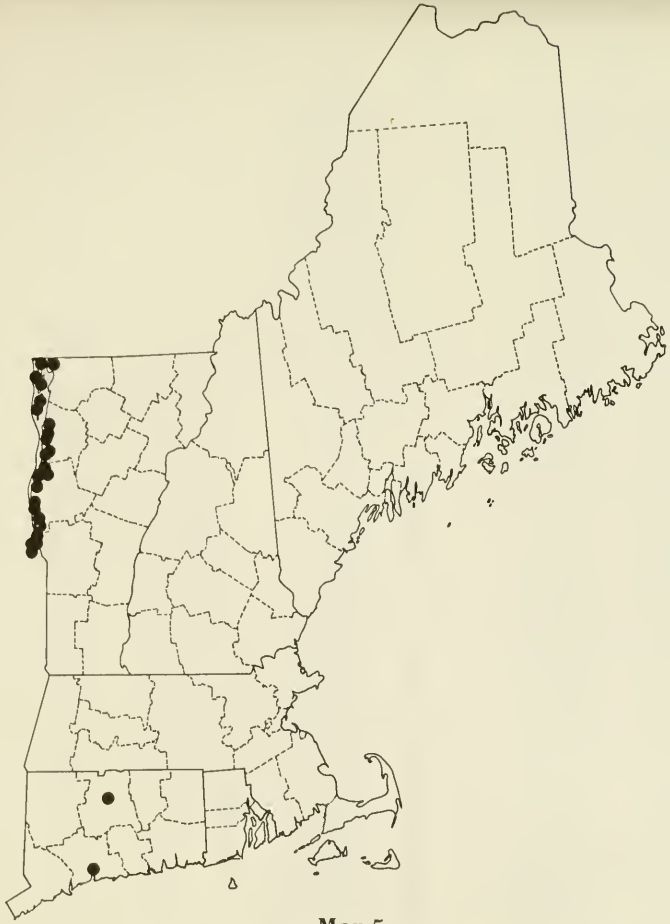
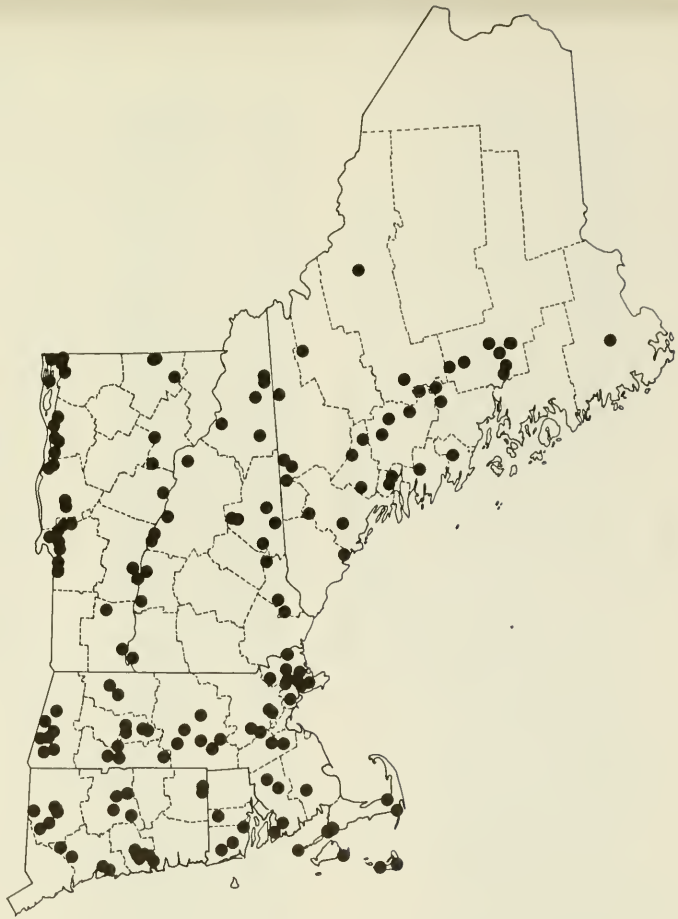


Figure 5

Vallisneria americana: **A. habit of staminate plant, x ¼. B. habit of pistillate plant, x ¼. C. staminate spathe, x 1. D. staminate flower, x 6. E. pistillate flower, x 1. F. fruit, x ¼. G. portion of leaf showing lacunae bands, x 1.**



Map 5
Butomus umbellatus



Map 6
Vallisneria americana

1. *Egeria densa* Planch. Fig. 6, Map 7

Rare plant of ponds in New England. This common aquarium plant has been introduced into North America from South America. Cold weather does not seem to adversely affect it once introduced into a pond. Populations are occasionally established at widely scattered areas, reproducing vegetatively. Occurring sporadically from Vermont and Massachusetts west to Illinois, Nebraska, Kansas, Oklahoma, south to Florida and Texas; Arizona, California, and Oregon.

Elodea (Waterweed)

Submersed perennial plant of streams, ponds and lakes; leaves in whorls of 3 (or 2), along the stem; dioecious or monoecious; flowers with 3 sepals and 3 petals; staminate flowers with the filaments united into a short column; pistillate flowers raised to the surface by an elongated hypanthium or sessile, but on maturity breaking loose, floating to the surface where buds open and the sepals diverge; fruit leathery, ovoid capsule, few seeded.

Key to Species

1. Leaves generally 0.3-1.5 mm wide, pointed at tip (fig. 7B), not densely overlapping toward stem apex (fig. 7A); staminate flowers enclosed in sessile spathes, released, floating to the surface at anthesis. ..... 1. *E. nuttallii*
1. Leaves generally 1.0-5.0 mm wide, blunt at tip (fig. 7I), not densely overlapping at tip (fig. 7F); staminate flowers enclosed in stalked spathes, reaching the surface at anthesis by elongation of hypanthium. ..... 2. *E. canadensis*

1. *Elodea nuttallii* (Planch.) St. John Fig. 7, Map 8

Common in acidic to moderately alkaline water of streams, lakes, and ponds in New England. Range extends from northern Maine and southern Quebec west to Idaho, south to North Carolina, Mississippi, Oklahoma, and New Mexico.

alkalinity: mean 23.5 mg/l; range 5.0-108.5 mg/l; (38)
pH: mean 6.9; range 5.6-8.9; (36)

2. *Elodea canadensis* Michx. Fig. 7, Map 9

Generally common in alkaline lakes, ponds and streams of New England. Staminate plants are rarely encountered and have leaves which tend to be longer and more linear or lance-oblong than the pistillate plants. Range extends from Quebec west to Saskatchewan and Washington, south to North Carolina, Alabama, Iowa, Texas, New Mexico, Arizona, and California.

Rare and endangered plant list: New Hampshire

alkalinity: mean 67.7 mg/l; range 10.0-153.0 mg/l; (64)
pH: mean 7.6; range 6.5-10.2; (60)

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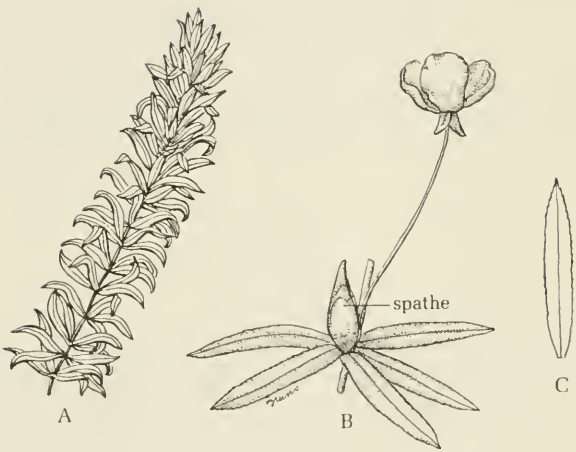


Figure 6
Egeria densa: A. habit, x ½. B. portion of plant with staminate flowers, x 1. C. leaf, x 1.

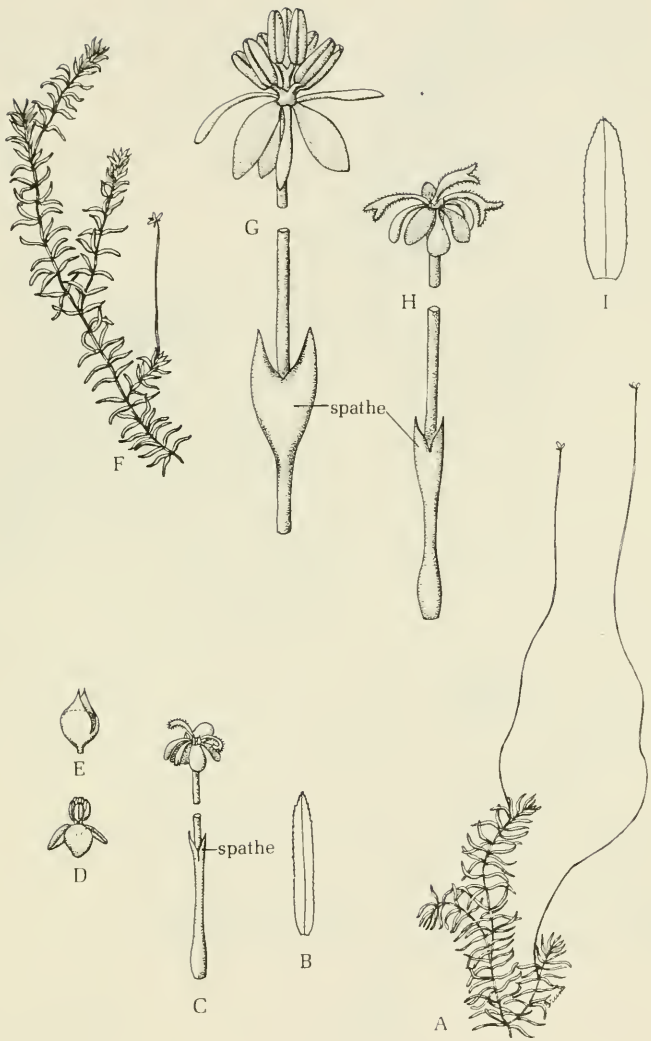
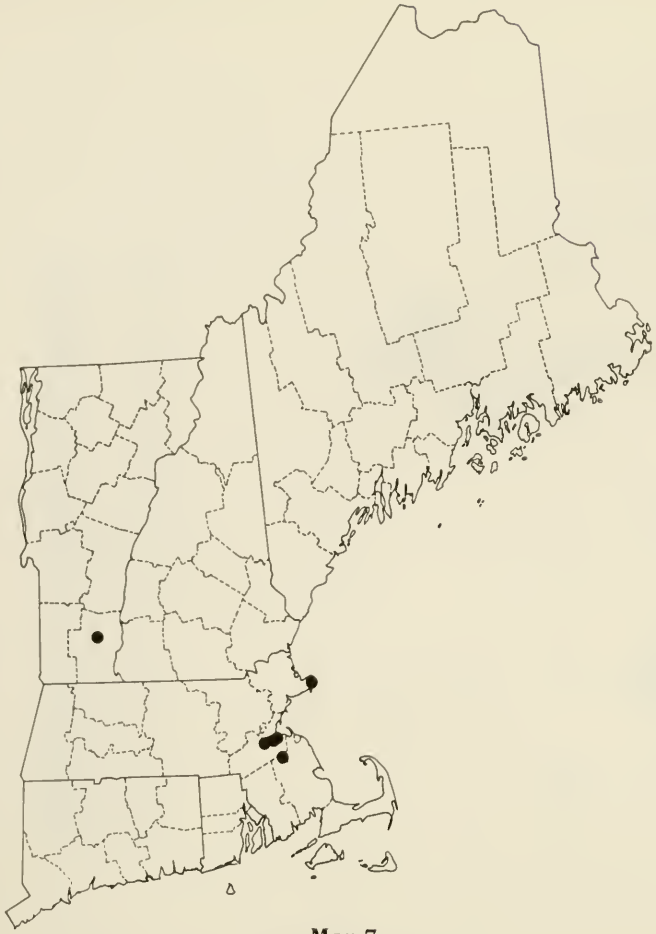
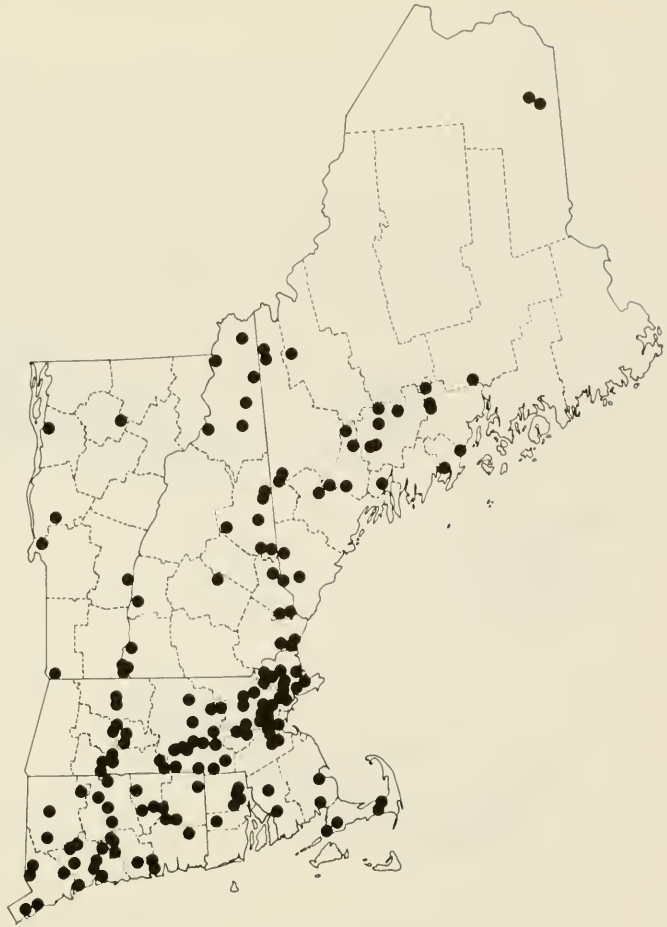


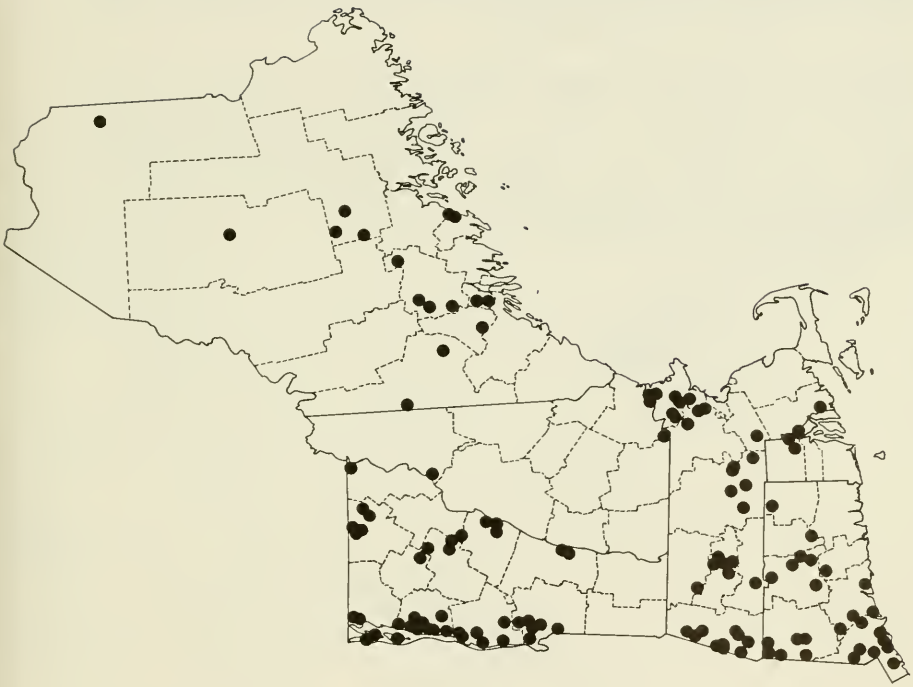
Figure 7
Elodea nuttallii: **A. habit, x ½. B. leaf, x 2½. C. pistillate flower, x 5. D. staminate flower, x 5. E. staminate bud with spathe, x 5.**
Elodea canadensis: **F. habit, x ½. G. staminate flower with spathe, x 5. H. pistillate flower, x 5. I. leaf, x 2½.**



Map 7
Egeria densa



Map 8
Elodea nuttallii



Map 9
Elodea canadensis

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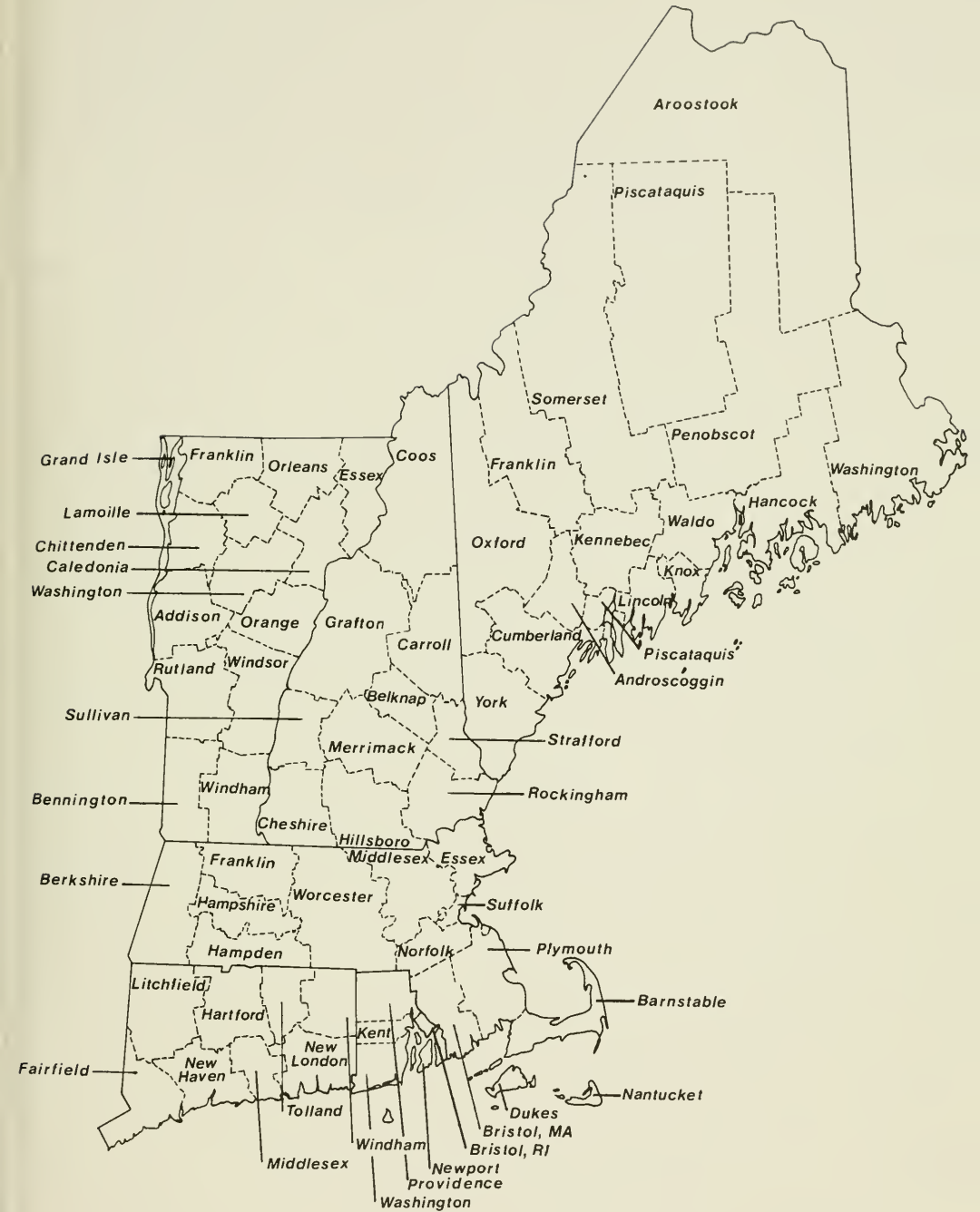
Aquatic Vascular Plants of New England: Part 2. Typhaceae and Sparganiaceae. G. E. Crow and C. B. Hellquist. Bull. No. 517. 1981.

Aquatic Vascular Plants of New England: Part 3. Alismataceae. C. B. Hellquist and G. E. Crow. Bull. No. 518. 1981.


Aroostook
Piscataquis
Somerset
Penobscot
Washington
Hancock
Waldo
Knox
Lincoln
Kennebec
Franklin
Oxford
Cumberland
Androscoggin
Piscataquis
York
Strafford
Rockingham
Merrimack
Belknap
Carroll
Grafton
Coos
Essex
Orleans
Franklin
Grand Isle
Lamoille
Chittenden
Caledonia
Washington
Addison
Orange
Windsor
Rutland
Sullivan
Bennington
Windham
Cheshire
Hillsboro
Middlesex
Essex
Suffolk
Norfolk
Plymouth
Barnstable
Nantucket
Dukes
Bristol, MA
Bristol, RI
Newport
Providence
Washington
Middlesex
Windham
Tolland
New London
Kent
Hartford
Litchfield
Fairfield
New Haven
Hampden
Hampshire
Worcester
Franklin
Berkshire